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(54) CABINET CORNER CONSTRUCTION FOR REFRIGERATOR  
OUTLET WRAPPER

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ABSTRACT OF THE DISCLOSURE

A corner construction for the outer wrapper of a refrigerator in which the wrapper is formed from a single metal sheet to define a top wall and two depending side walls. The walls are bounded by a forwardly facing integrally formed flange terminating in an inwardly turned reverse bend and an inwardly extending leg which define similar channels between the leg and the top wall and the side walls. The channels intersect perpendicularly at the corners. An L-shaped bracket having two perpendicularly diverging arms, each with a width substantially equal to that of the channels, is positioned within the channels at each corner so that in the assembled relationship the bracket snugly engages the inwardly extending leg and opposed side wall or top wall respectively, rigidifying the corner construction. The bracket is formed from a substantially heavier gauge metal than the outer wrapper and defines in cross-section a shape generally complementary with the shape of the channels and having sufficient dimensions to withstand normally encountered forces. The bracket can be maintained in proper position within the channel either with a structural industrial adhesive or screw or, if used in the outer wrapper of a refrigerator including foamed-in-place insulation, the inherent snug fit is sufficient to maintain it in proper position. Further, that portion of the bracket abutting the walls defines a notch providing a guide for properly positioning a dewpoint heater in intimate contact with the outer wrapper at the corners.

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BACKGROUND OF THE INVENTIONField of the Invention:

This invention pertains to the outer wrapper of refrigerator/freezers and more particularly to structure rigidifying the corners thereof to eliminate welding and permit the use of a prefinished metal sheet.

Description of the Prior Art:

It is presently common practice to form the

- 10 outer wrapper of refrigerators and refrigerator/freezers from a single sheet of metal. Because of the subsequent handling of such wrappers during further assembly, i.e. painting, foaming, etc., it is necessary to in some way provide sufficient rigidity for them to maintain their proper shape. Heretofore, this was generally accomplished through various corner configurations which provided in some manner overlapping of closely adjacent metal portions which were then welded. Although such structure has been entirely satisfactory, it requires a subsequent finishing operation to cover the exposed weld. Exemplary of such configurations are U.S. Patents 960,934, 2,808,309 and 20 3,264,730.

It has been determined that a substantial cost reduction could be realized if the outer wrapper were formed from a prefinished sheet of metal (i.e. prepainted). However, this precludes the use of a welded corner, as the economic advantage would be lost if any subsequent finishing operation was required.

- 30 Thus, the present invention provides a rigid corner construction particularly adapted to the outer wrapper



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of a refrigerator or refrigerator/freezer that eliminates the necessity of a weld and thus permits the use of a prefinished metal sheet.

The present invention resides in an outer wrapper for a refrigerator cabinet formed from a one-piece metal sheet to include a top wall and a pair of depending opposed facing side walls, the side walls being bounded at their forward edge by an integrally formed forwardly facing flange. The juncture of each of the side walls to the top wall and the respective associated flanges define a corner and include means to maintain each of the corners rigid, the means including the above mentioned flange which terminates in an inwardly turned reverse bend with a rearwardly projecting leg portion extending therefrom in a plane generally parallel to the respective adjacent wall of the wrapper to effectively define in conjunction with the internal face of the flange and the respective wall a channel. A part of the forwardly facing flange of one of the walls is mitered at the juncture, and a triangular section of the forwardly facing flange adjacent the juncture along the other wall forming the corner is rearwardly offset out of the general plane of the forwardly facing flange a distance substantially equal to the thickness of the flange forming a shoulder disposed at an angle complementary to the mitered edge. The triangular section extends generally parallel to the plane of the flange so as to normally engage the rearward face of the mitered flange throughout the extent of the section at the corner. Corner bracket means is disposed within the channel, the bracket means including a flat "L" shaped member with a pair of arms disposed perpendicular to one another. Each arm thereof extends a distance along a respective channel and generally has sufficient width to be snugly engaged therein to maintain a

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substantially rigid corner in the wrapper. The portion of each arm in snug engagement with each opposing wall of the channel defining a space of sufficient area for distributing normally encountered bending forces without causing deformation of the outer shell adjacent the corner structure, with the arm of the bracket in the channel associated with the side wall having an aperture therein for alignment with an aperture in the flange for threadably receiving a bolt for mounting a door hinge on the flange so that the bracket strengthens the flange for support of a door thereon.

In a specific embodiment of the invention, the bracket is formed from a heavier gauge material than the wrapper, and each arm of the bracket defines a channel.

Preferably a dimple is provided on the triangular section protruding sufficiently to interferingly engage the reverse bend and maintain the triangular section in intimate facing contact with the mitered section of the flange. The triangular section may have a leading edge rearwardly directed to assure the triangular section passes rearwardly of the flange.

The invention will be described with reference to the accompanying drawings, in which

Figure 1 is an isometric view of a refrigerator cabinet with the door removed to disclose the top corners pertinent to the invention;

Figure 2 is an enlarged isometric view of a part of the wrapper prior to the formation of a corner to illustrate the configuration of the terminal edge of the forwardly facing flange;

Figure 3 is an exploded isometric view similar to Figure 2 subsequent to the formation of a corner and including

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a bracket in position for assembly into the corner.

Referring to Figure 1 a cabinet 10 is shown for a refrigerator or freezer and includes a box-like liner 12 disposed within a wrapper 14 with thermosetting foam insulation 15 disposed therebetween. The wrapper is formed from a single sheet metal piece to provide a top wall 18 and two depending side walls 16. The forward edge of each side wall and the top wall is bent perpendicularly to its respective wall to form a forwardly facing front flange 20. At each juncture of the side wall, top wall and front flange are corners 22 and 24, each constructed in accordance

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with the invention. In the preferred embodiment the wrapper is formed from prefinished sheet metal, i.e. metal having the external surface textured or painted prior to formation of the cabinet. A hinge plate 26 and its mounting bolts 28 are shown on the front flange 20 near the top left hand corner 22, to be used for hingedly mounting a door structure (not shown).

A part of the wrapper 14 immediately adjacent to and including the components of corner 22 is shown in Fig. 10 2 as typical corner construction in accordance with this invention. As therein shown, the front flange 20 is bent to be disposed at a right angle with the side wall 16 and the top wall 18. The terminal edge of flange 20 is inwardly turned in a reverse bend so that a portion 30 is disposed generally parallel to, and in spaced opposed facing relationship with the flange 20 forming a slot 32 therebetween. The edge is then bent to form an inwardly projecting leg 34 and in the preferred embodiment terminates in another reverse bend 36. Parts 30, 34 and 36 20 viewed in cross-section form a generally U-shaped lip 37. The bight portion 34 of the U-shaped lip and the interior side of the respective side wall 16 or top wall 18 cooperate to form, with the interior side of flange 20, a channel 38 extending substantially throughout the length of the respective walls.

Figure 2 also shows the mitered preparation of the flange 20 and the lip 37 which permits the flange and the respective channels associated with each wall to meet at right angles at the corners. As therein seen, the side 30 wall 16 and the top wall 18 will be bent at right angles

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along fold line 40 to form a representative corner. The formation of a mitered corner for the forwardly facing flange 20 requires the displacement of material which would otherwise prevent a right angle juncture. In this instance, a portion of the flange 20 associated with the side wall 16 has been removed (as by shearing) along a line generally  $45^{\circ}$  from the vertical extension of fold line 40 forming an edge 42. The inwardly formed U-shaped lip 37 has similarly been cut along a  $45^{\circ}$  line forming an edge 44 which is seen to be offset from edge 42 a slight distance.

The adjacent portion of flange 20 associated with the top wall 18 rather than being removed, has been rearwardly offset along a line to form a shoulder 48 generally  $45^{\circ}$  from the vertical extension of fold line 40 providing a triangular section 46 in a plane parallel to the plane of flange 20 but disposed rearwardly a distance generally equal to the thickness of the sheet so that as the adjacent flange areas 20 come together (as shown in Fig. 3), section 20 46 is disposed immediately rearwardly of flange 20 of the side walls. A slight rearwardly extending curl 47 (Fig. 2) is formed at the leading edge of section 46 to assure that section 46 passes to the rear of opposing flange 20. Again, U-shaped lip 37 has been sheared along a  $45^{\circ}$  line forming edge 50 which will be in spaced facing relationship with edge 44 of the mating U-shaped lip when the corner is formed to accommodate necessary manufacturing tolerances and yet insure the lips do not abut in a way that prevents the right angle corner from being formed.

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dimple 52 is formed into portion 46 generally adjacent the U-shaped lip 37 and has a height generally sufficient to be engaged in slot 32 when the corner is formed. Further, the front flange 20 associated with the side wall 16 and offset section 46 can have elongated apertures 54, 56 and 58 respectively, with aperture 58 disposed so as to be generally concentric with aperture 56 when the corner is formed for a purpose to be subsequently explained.

The structure above described in Fig. 2 is formed 10 into the corner configuration of Fig. 3 by bending the side wall 16 toward the top wall 18 along fold line 40. As this occurs, the offset triangular section 46 is inserted into the slot 32 between the flange and the lip. In the final configuration, the mitered edge 42 of the flange abuts against the offset shoulder 48 with the stepped triangular section 46 overlapping the interior face of flange 20. The dimple 52 engages the adjacent face of the reverse bend section 30 forcing the offset section 46 into contact with flange 20. Since the mitered edge 44 of 20 the lip 37 is removed from the plane of edge 42, as previously explained, edge 42 is able to abut offset shoulder 48. This, combined with the facing contact between the flange 20 and the triangular section 46 provides a substantially tight, smooth corner juncture which enhances the appearance of the miter of the flange and also serves as a corner seal to prevent the escape or leakage of the thermosetting foam insulation, should the refrigerator cabinet subsequently be foam insulated as is well known in the prior art. The apertures 54, 56 and 58 previously identified provide clearance holes for the hinge bolts 28, only

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one being shown, which secure the hinge plate 26 (Figure 1). These apertures normally appear in the flange only at corners to which a hinge will be attached, but may be in both right and left top corners in cases where provision is made for optional selection of right or left door swing, such that the top hinge is moved to the side desired, and the opposite holes are plugged with either screws or plastic decorative hole plugs.

Referring to Figure 3, the corner is shown ready for completion by the addition of a reinforcing or rigidifying bracket 60 attached to the back of flange 20. The bracket 60 includes two arms 62 and 64, respectively, disposed perpendicularly to each other with the arms being generally mirror images of each other about their intersection. In the preferred embodiment, each arm is made to have a U-shaped cross-sectional configuration generally complementary to the channel 38 having a web 66, an inside flange 68 and an outside flange 70. The web 66 is sufficiently wide to cause the bracket to be snugly received within channel 38 with the flanges 68 and 70 bearing against the inward projecting leg 34 of the lip 37 and the interior side of the side wall 16 or top wall 18, respectively. The height of the flanges 68, 70 and the length of each respective arm is generally sufficient to provide a surface area capable of distributing any normally encountered bending forces without causing deformation of any corner structure. The bracket 60 is positively maintained in its final orientation, in which the web 66 generally abuts the interior face of flange 20 by the frictional engagement provided by the snug fit; however,

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the bracket can be further secured either by the hinge bolt 28 received in corresponding apertures 74 in the web or by structural industrial adhesive 72 between the web 66 and flange 20. It has also been found that, in those refrigerators which are subsequently foam insulated, the snug engagement is generally sufficient to maintain the bracket in proper position until the foam has cured sufficiently for it to positively hold the bracket in place. The combined bearing of the inside 10 flange 68 on the inward projection 34 and the outside flange 70 on the top wall and side wall respectively, thus rigidly holds the wrapper 14 in this corner orientation and rigidifies the corner by resisting any natural spring force of the wrapper, which if uninhibited may cause the corner to open, and any forces encountered during subsequent operations performed on the wrapper.

Still referring to Fig. 3 it is seen that the outer flange 70 of bracket 10 terminates in a stepped or offset portion 82 that extends throughout the length of 20 the flange 70. This offset portion, in conjunction with the adjacent wall structure of the outer wrapper provides a recess 84 for guiding a dew point heater 86 around the corner, maintaining the heater 86 in intimate contact with the outer wrapper while shielding it from being contacted and possibly broken during subsequent assembly of the hinge bolts 28 which may project into the general vicinity.

It is to be noted that the mirror image configuration of the bracket (including apertures 74 always being provided therein) permit a single configuration to be used 30 in both a right or left corner interchangeably, either with

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or without a door hinge being mounted therewith and also has provision for optionally accommodating a dew point heater.

Thus, the cooperation of the corner configuration of the outer wrapper with the rigidifying complementary bracket snugly received therein provides a structurally rigid corner capable of withstanding forces that would otherwise deform the outer wrapper and permits the use of prefinished sheet metal by eliminating any welding on visible surfaces. In addition to providing a means for rigidifying the corner of a prefinished outer wrapper to maintain its proper shape during manufacture, the corner construction is also sufficiently rigid to be used as the permanent means for rigidifying the corner of fiber insulated refrigerators having a prefinished outer wrapper.

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THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE AS FOLLOWS:

1. In an outer wrapper for a refrigerator cabinet formed from a one-piece metal sheet to include a top wall and a pair of depending opposed facing side walls, said walls being bounded at their forward edge by an integrally formed forwardly facing flange, the juncture of each of said side walls to said top wall and the respective associated flanges defining a corner, and including means to maintain each of said corners structurally rigid, said means comprising: said flange terminating in an inwardly-turned reverse bend with a rearwardly projecting leg portion extending therefrom in a plane generally parallel to the respective adjacent wall of the wrapper to effectively define in conjunction with the internal face of said flange and said respective wall a channel; a part of said forwardly facing flange of one of said walls is mitered at said juncture, and a triangular section of said forwardly facing flange adjacent said juncture along the other wall forming said corner is rearwardly offset out of the general plane of said forwardly facing flange a distance substantially equal to the thickness of said flange forming a shoulder disposed at an angle complementary to said mitered edge; and wherein: said triangular section extends generally parallel to the plane of said flange so as to normally engage the rearward face of said mitered flange throughout the extent of said section; at said corner, corner bracket means disposed within said channel, said bracket means comprising a flat "L" shaped member with a pair of arms disposed perpendicular to one another, each arm thereof extending a distance along a respective channel and generally having sufficient width to be snugly engaged therein to maintain a

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substantially rigid corner in the wrapper, the portion of each arm in snug engagement with each opposing wall of said channel defining a space of sufficient area for distributing normally encountered bending forces without causing deformation of the outer shell adjacent the corner structure, with the arm of said bracket in the channel associated with the side wall having an aperture therein for alignment with an aperture in the flange for threadably receiving a bolt for mounting a door hinge on said flange whereby said bracket strengthens said flange for support of a door thereon.

2. Structure according to claim 1, wherein said bracket is formed from a heavier gauge material than said wrapper and wherein:

each arm of said bracket defines a channel.

3. Structure according to claim 1 further including:

a dimple on said triangular section protruding sufficiently to interferingly engage said reverse bend and maintain said triangular section in intimate facing contact with said mitered section of said flange.

4. Structure according to claim 1 wherein:

said triangular section having a leading edge rearwardly directed to assure said triangular section passes rearwardly of said flange.



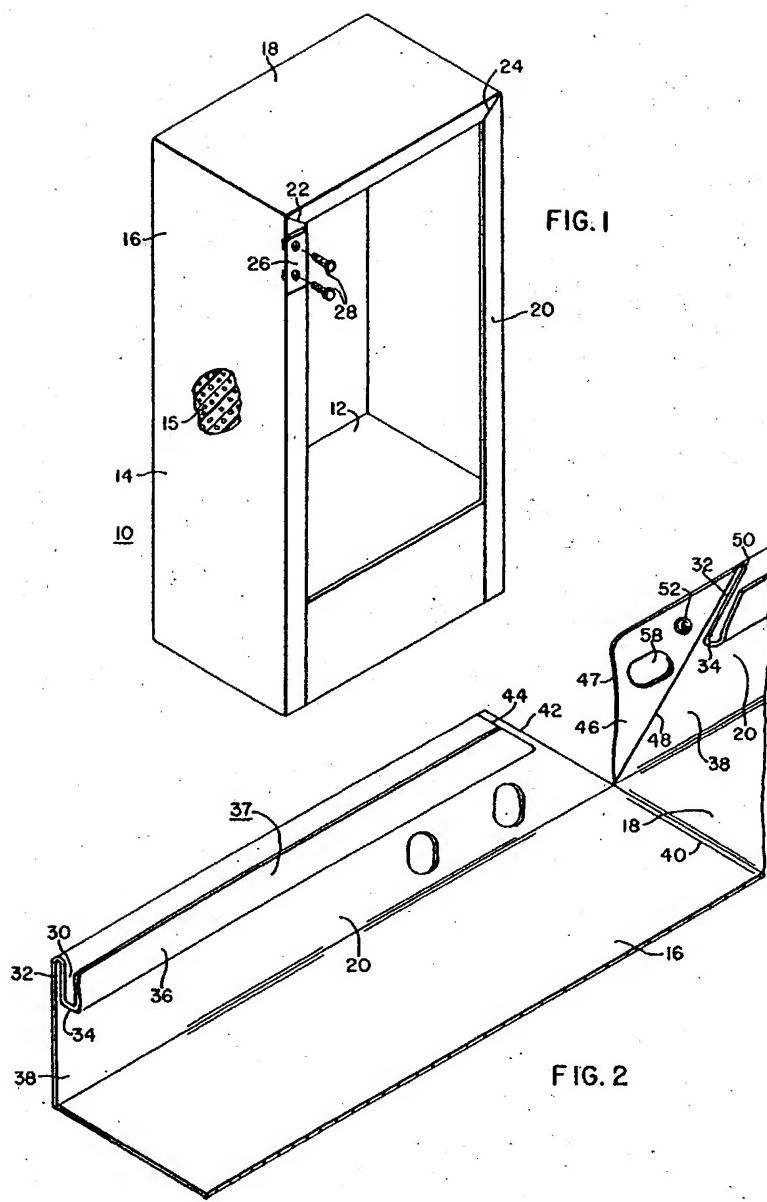


FIG. 1

FIG. 2

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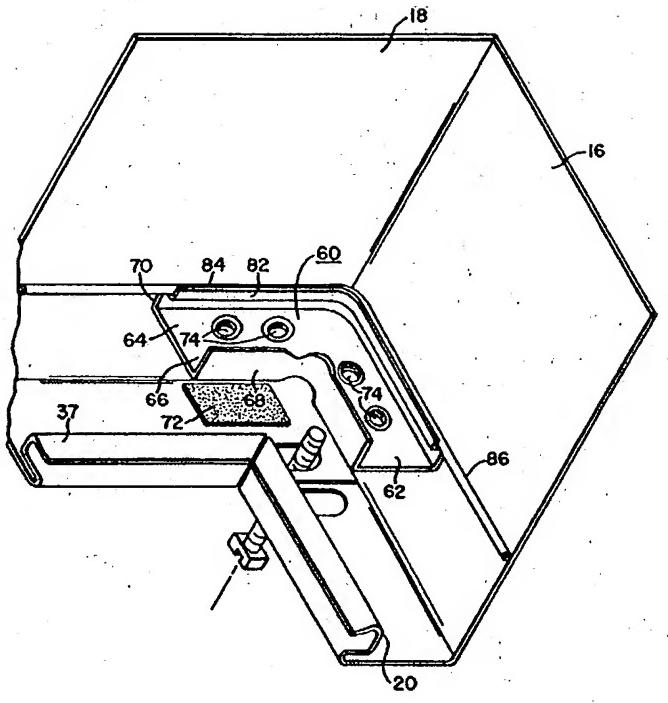


FIG. 3